CLAIMS

1. A portable device for the production of electrical energy, comprising a matrix of one or more conversion modules (11), operating in series or in parallel, each of which comprises:

- a combustion chamber (14) made of material that is able to withstand high temperatures,
- an injection device (16) connected to said combustion chamber (14) by means of an injection conduit (15),
- a controller (30) of the injection frequency and hence of generated power,
- means (17) for supplying combustion support substance into the combustion chamber (14),
- means (18) for the removal of gaseous combustion products,
- means (26) for the selective emission of radiation onto the outer surface of the combustion chamber (14)
- means (24) for the conversion of radiant energy into electrical energy,
- means for igniting the combustion reaction,

characterised in that the combustion chamber (14) is enclosed in a conversion chamber (20) within which are maintained sub-atmospheric pressure conditions, so that a substantial part of the heat developed by the combustion reaction is converted into electromagnetic radiation.

2. A system as claimed in claim 1, characterised in that the combustion chamber (14) has substantially spherical shape and in that the conversion chamber (20) has semi-ellipsoidal shape, with the combustion chamber (14) positioned in correspondence with a first focus of the ellipsoid.

3. A system as claimed in claim 2, characterised in that said conversion means (24) are positioned on a planar surface that is perpendicular to the greater axis of the ellipsoid and passes through the centre of the ellipsoid itself.

4. A system as claimed in claim 1, characterised in that said means (24) for the conversion of radiant energy into electrical energy comprise a plurality of photovoltaic cells.

5. A system as claimed in claim 1, characterised in that said means for the selective emission of radiation have a narrow emission band with a peak in correspondence with the wavelength at which the conversion means (24) have the maximum conversion efficiency.

6. A system as claimed in claim 1, characterised in that said means for the selective emission of radiation comprise a lining (26) applied onto the outer surface of the combustion chamber (14), said lining being constituted by a material selected in the group comprising: micro-structure metal, metallic or dielectric photonic crystal, oxide or mixture of oxides of rare earths.

7. A system as claimed in claim 1, characterised in that the outer surface of the combustion chamber (14) has such a total area that the radiant energy emitted by the emission means (26) is equal to the sum of the total thermal energy developed by the combustion reaction at steady state and of the fraction of radiant energy that is reflected by the inner walls of the conversion chamber or by the conversion means (24) and reabsorbed by the combustion chamber (14).

8. A system as claimed in claim 1, characterised in that said conversion chamber (20) has axes whose

size ranges between 3 and 50 times the diameter of the combustion chamber.

9. A system as claimed in claim 1, characterised in that said injection device (16) is a head of the ink-jet type.

10. A system as claimed in claim 9, characterised in that said injection head is of the "bubble" ink-jet type.

11. A system as claimed in claim 9, characterised in that said injection head is piezoelectric.

12. A system as claimed in claim 1, characterised in that the combustion chamber (14) is constituted by material with high thermal conductivity and able to withstand high temperatures.

13. A system as claimed in claim 12, characterised in that part of the inner surface of the combustion chamber (14) is coated with a porous layer of material with low thermal conductivity and able to withstand high temperatures.

14. A system as claimed in claim 13, characterised in that the porosities of said porous layer are coated by a catalysing material serving the purpose of lowering the activation temperature of the combustion reaction and of limiting the generation of noxious combustion products.

15. A system as claimed in claim 12, characterised in that the combustion chamber (14) is made of metallic material.

16. A system as claimed in claim 15, characterised in that said metallic material is constituted by tungsten or molybdenum.

17. A system as claimed in claim 1, characterised in that said injection conduit (15) and said means (17) for supplying the combustion support substance and said

means (18) for extracting the combustion gases are made of a material with low thermal conductivity.

18. A system as claimed in claim 17, characterised in that the outermost segment of the exhaust conduit (18) is made of a material with high thermal conductivity to allow combustion products to yield the residual heat before exiting the conversion chamber.

19. A system as claimed in claim 1, characterised in that the injection conduit (15) and the means (17) for injecting the combustion support substance independently end into the combustion chamber (14).

20. A system as claimed in claim 1, characterised in that the means (17) for the injection of the combustion support substance end into the injection conduit (15) before entering the combustion chamber (14).

21. A system as claimed in claim 1, characterised in that the conversion chamber (20) is formed within a structure (19) made of optically polished metallic material.

22. A system as claimed in claim 1, characterised in that the conversion chamber (20) is defined within a structure (19) made of plastic or ceramic material and coated with a layer (23) of material with high reflectance.

23. A system as claimed in claim 4, characterised in that the surface of said photovoltaic cells facing the interior of said conversion chamber (20) is coated with an optical lining operating on the long wavelengths of the electromagnetic radiation as a band pass filter with transmittance peak in correspondence with the wavelength at which the photovoltaic cells have the maximum conversion efficiency.

24. A system as claimed in claim 4, characterised in that said photovoltaic cells are based on Schottky junctions.

25. A system as claimed in claim 24, characterised in that said Schottky junctions are made of silica and aluminium.

26. A system as claimed in claim 23, characterised in that said optical lining is made of a material selected from the group comprising: multilayer dielectric lining, metallic lining at the percolation state, metallic photonic crystal, anti-reflection micro-structure.

27. A system as claimed in claim 1, characterised in that the injection device (16) is constituted by a miniaturised Bunsen burner.

28. A system as claimed in claim 17, characterised in that the gaseous fuel injected by said injection device (16) belongs to the group comprising: methane, propane, butane, hydrogen, natural gas.

29. A system as claimed in claim 1, characterised in that the exhaust conduit (18) is internally coated with catalysing material able to neutralise the noxious products of the combustion reaction.

30. A system as claimed in claim 1, characterised in that the exhaust conduit (18) has an articulated path in order to favour the cooling of the exhaust gas.

31. A system as claimed in claim 1, characterised in that the injection conduit (15) has an articulated path in order to prevent the combustion products to return towards the injection means.

32. A system as claimed in claim 1, characterised in that said ignition means are electrical and the combustion is started by an electrical discharge, by a spark or by an incandescent filament.

33. A system as claimed in claim 1, characterised in that vacuum is obtained inside the conversion chamber (20).

34. A system as claimed in claim 1, characterised in that inside the conversion chamber (20) is contained an inert gas at sub-atmospheric pressure.

35. A system as claimed in claim 33, characterised in that the conversion chamber is constituted by optically polished metallic material.

36. A system as claimed in claim 33 o 34, characterised in that the conversion chamber is constituted by optically polished ceramic material.

37. A system as claimed in claim 1, characterised in that the inner wall of the conversion chamber is coated by layer having high reflectance over the whole spectrum of the radiation emitted by the emission means (26).